ESPRIT: Exploratory submm Space Radio-Interferometric Telescope

Thijs de Graauw, J. Cernicharo, A. Bos, J. Bregman, L. Darcio, J.-W. den Herder, A. Gunst, F. Helmich, P. Maat, J. Noordam, A. Quirrenbach, P. Roelfsema, L. Venema, P. Wesselius, W. Wild, J.Martin-Pintado, and P. Yagoubov

(Email: thijsdg@sron.rug.nl)

[1]SRON National Institute for Space Research of The Netherlands
[2]ASTRON Netherlands Foundation for Research in Astronomy
[3]CSIC Instituto de Estructura de la Materia, Madrid, Spain
[4]University of Leiden, The Netherlands

We will present a mission concept for a free-flying FIR imaging interferometer using radio techniques. The ultimate goal is to reach a Hubble ST-equivalent spatial resolution for the FIR wavelength range. The main scientific objectives are imaging in the emission lines of water and molecular ions, imaging in important atomic fine-structure lines: CII, NII, OI, and imaging in high excitation lines of CO, HCN, HCO+, etc., of star forming regions and proto-planetary systems with emphasis on studies of the evolution of disks. The facility will be the FIR complement of the ground-based ALMA without any atmospheric attenuation and disturbance in phase and transmission. It will be a follow-up mission of ISO-LWS, SWAS, ODIN, SIRTF, ASTRO-F; Herschel-PACS and -HIFI and of MIRI on JWST.

The aimed characteristics are:

Telescope sizes:	$\sim$ >3.5 meter ; off-axis
Number of elements:	$N > 6$; free-flying
Proj. Baselines:	$\sim$ 7–500 meter
Frequency coverage:	in the 1.5–6 THz range (200 m 50 m)
Spectral Resolution:	1 km/s at 100 m. (0.1 goal)
Spatial Resolution:	0.02 at 100 m
F.O.V.:	$\sim$ 6
Pointing Requirements:	- accuracy: 0.2; - knowledge: 0.1
Image Dynamic range:	100
Spectral Dynamic range:	1000
Tsys:	1000 K (N receiver bands; HEB mixers @5 K; dual polarisation; QCL as LOs)
IF:	4 GHz wide; InP pre-amps
Correlator:	4 sections of 1 GHz, each 128 channels

From the inherent narrow band capability of heterodyne techniques, the substantial advantages for path length difference compensation and tracking will be elaborated as well as the expected detection and imaging sensitivity. We will present a study program covering the scientific objectives, instrumentation, interferometer configuration, delay lines and correlation techniques.